

A REVISION OF *ACONOOGONON* (= *POLYGONUM*
SECT. *ACONOOGONON*, POLYGONACEAE)
IN NORTH AMERICA

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ABSTRACT

An account with keys, illustrations, and distribution maps of the three species of North American *Aconogonon* (= *Polygonum* sect. *Aconogonon*) is given. Epidermal anatomy of the leaf and pollen morphology are also briefly studied. One new variety, *A. phytolaccifolium* var. *glabrum* S.-P. Hong, is described. Two new combinations proposed are *A. hultenianum* var. *lapathifolium* (Cham. & Schlechtend.) S.-P. Hong and *A. davisiae* var. *glabrum* (Jones) S.-P. Hong. Two species names are relegated to synonymy. A neotype for *A. hultenianum* var. *lapathifolium* (Cham. & Schlechtend.) S.-P. Hong, and a lectotype for *A. davisiae* (Brewer ex A. Gray) Soják are selected.

Key Words: Polygonaceae, *Aconogonon*, *Polygonum* sect. *Aconogonon*, epidermal anatomy, pollen morphology, taxonomy, distribution, North America

INTRODUCTION

This paper presents a taxonomic revision, including information on epidermal anatomy of leaves and on the pollen morphology of the three North American species of *Aconogonon* (Meisn.) Reichb. (= *Polygonum* sect. *Aconogonon*). This account forms an extension of a revision of this genus in the Himalayas and adjacent regions (Hong, in prep.), and is part of a world-wide taxonomic revision of the genus.

Aconogonon has been treated as a separate genus or as a section under allied genera (cf. Haraldson, 1978; Ronse Decraene and Akeroyd, 1988). However, the genus can be separated from allied genera in the tribe Persicariae Dum. by its very uniform pollen type (Hedberg, 1946; Hong and Lee, 1983; Hong and Hedberg, 1990), a morphologically distinctive inflorescence, some anatomical features (Haraldson, 1978), and its seed anatomy (cf. Marek, 1954, 1958). Recently, Ronse Decraene and Akeroyd (1988) delimited the *Polygonum sensu lato* group on the basis of microcharacters of the floral parts. While treating *Aconogonon* as a section under the genus *Persicaria* Mill., they agreed that some microcharacters in the *Aconogonon* group provide distinctions from the other sections. The generic limits have been accepted

by many authors (Hedberg, 1946; Hara, 1966, 1982; Haraldson, 1978; Wilson, 1988), and many modern floras use *Aconogonon* as a generic name (Hara, 1966, 1982; Grierson and Long, 1983; Polunin and Stainton, 1984; Tzvelev, 1987; Stainton, 1988; Hong, 1990). In this treatment I consider *Aconogonon* a natural group and recognize it as a separate genus.

Polygonum polystachyum Wallich ex Meisn., which has been introduced into North America, has sometimes been brought to *Aconogonon*. But the pollen grains of this species, like those of *Polygonum pinetorum* Hemsly from SW China, clearly belong to the *Persicaria* type (cf. Hong and Hedberg, 1990), and both those species should be brought to the genus *Persicaria*, although their inflorescences show some similarities to those in *Aconogonon*. Therefore, *P. polystachyum* is excluded from the present study. Recently Král (1985) created a new genus (*Rubrivena*) for *P. polystachyum*, but I do not agree to that. The distinctness between *Aconogonon*, *Persicaria* and *Koenigia* L. will be further discussed in a later paper (Hong, in prep.).

MATERIALS AND METHODS

This study is mainly based on herbarium specimens. The following herbaria have been consulted: A, ALA, BM, CAN, GH, JEPS, K, MO, MU, NY, S, UBC, UC, UPS, US, WS and WTU (abbreviations according to Holmgren et al., 1981). In all, about 700 collections were examined for this study.

Epidermal structures were investigated using cuticular membrane preparations. The macerating mixture used was Jeffrey's solution (equal parts 10% chromic acid and concentrated nitric acid). After about 24 hours in the mixture, the leaf samples were transferred to water in a Petri dish, washed with a camel's hair brush, then stained in 1% safranin. Most measurements were made on dry material, but floral parts were measured using boiled material. Pollen studies were made on acetolyzed samples mounted in glycerin jelly and sealed with paraffin, according to the standard method (Erdtman, 1960). Scanning electron microscope examinations were made, both on acetolyzed pollen and untreated herbarium material of leaf parts, coated with Au/Pd. Scanning electron microscope (SEM) studies were made with a Jeol JSM-35 instrument.

The terminology follows Stearn (1983) in general morphology,

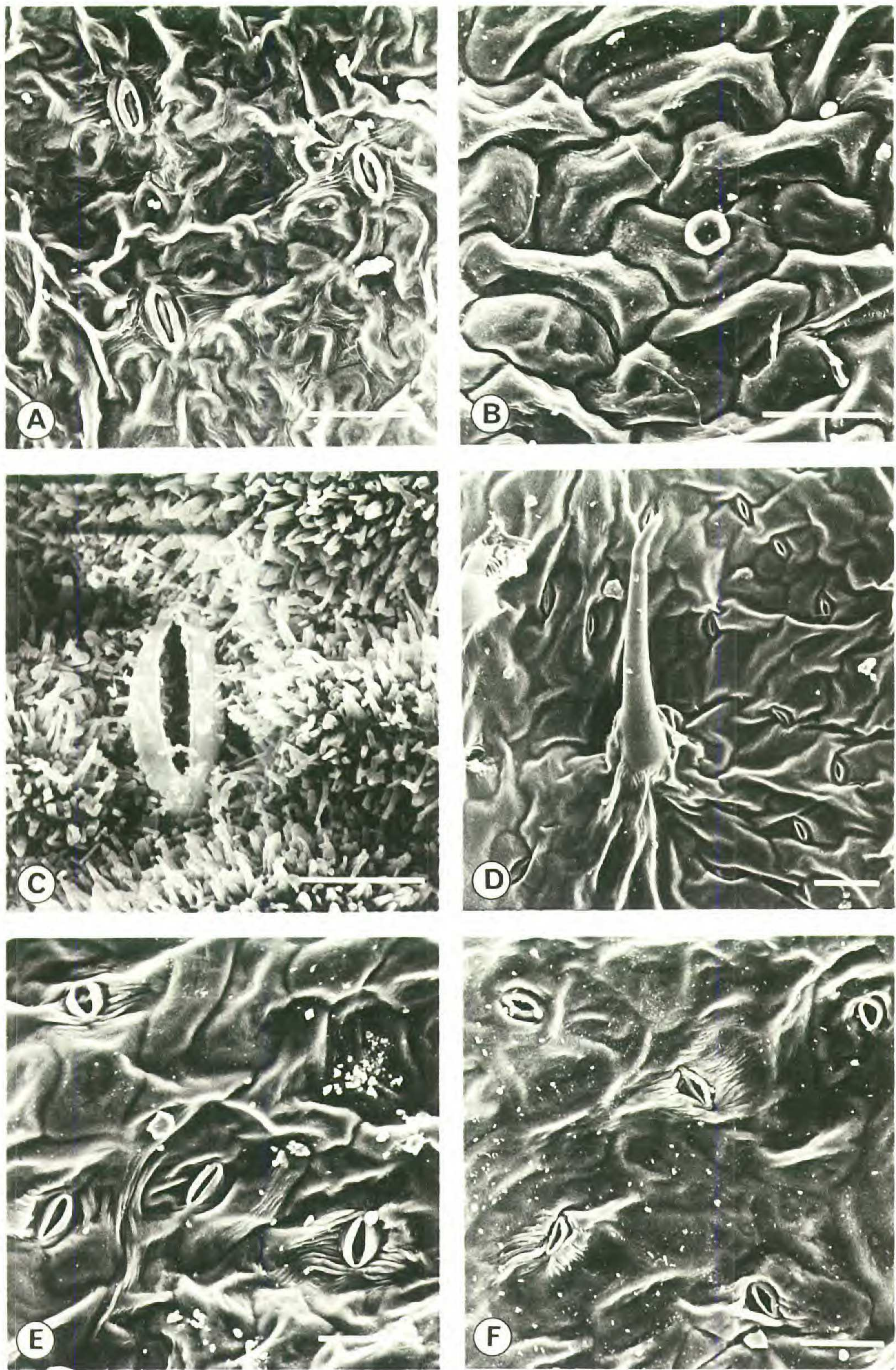


Figure 1. SEM photographs of details of leaf epidermis in North American *Aconogonon* spp. **A.** Stomata in abaxial side, showing slightly striate cuticula (*A. hultenianum* var. *lapathifolium*, Batten 87-3). **B.** Stomata absent in adaxial side (*A. hultenianum* var. *lapathifolium*, Batten 87-3). **C.** Stomata with dense wax crystals in abaxial side (*A. davisiae* var. *davisiae*, Mastrogiuseppe 4713). **D.** Scat-

Wilkinson (1979) in leaf epidermal anatomy, and Erdtman (1966), and Hong and Hedberg (1990) in palynology. A complete list of all specimens studied has been prepared separately and is on deposit at UPS.

RESULTS

Leaf Epidermal Anatomy

In *Aconogonon phytolaccifolium* (Meisn. ex Small) Rydb. and *A. davisiae* (Brewer ex A. Gray) Soják the leaves have stomata on both surfaces (amphistomatic); the stomata are usually anisocytic and anomocytic, and $30\text{--}34 \times 18\text{--}22 \mu\text{m}$. The stomata of *A. phytolaccifolium* are slightly larger than those of the other species. In *Aconogonon hultenianum* (Yurtz.) Tzvel. stomata are present only on the abaxial leaf surface (leaves are hypostomatic); the stomata are usually anomocytic, and ca. $30 \times 20 \mu\text{m}$ (Figures 1A and 1B). Wax crystals in the form of rods and filaments (type b, group 2 of Wilkinson, 1979), showing a dense mass of individual rods nearly perpendicular to the surface, were observed on both sides of leaves of some *A. davisiae* specimens (Figure 1C). The cuticula is mostly striate on both sides of the leaves of *A. phytolaccifolium* (Figures 1E and 1F) and slightly striate on the abaxial side of the leaves in *A. hultenianum* (Figure 1A). In *A. davisiae* cuticular striation is apparently absent on both sides of the leaves (Figure 1D).

On both upper and lower leaf surfaces of *Aconogonon hultenianum* and *A. phytolaccifolium*, there are depressions containing peltate, glandular trichomes (Figure 1B). Taxonomically, epidermal structures proved of only limited diagnostic value.

Pollen Morphology

The pollen morphology of two North American species had previously been studied, but only by light microscope (Hedberg, 1946). In the present study, pollen morphology of these species

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tered stomata with trichome in adaxial side (*A. davisiae* var. *davisiae*, Gillett 310). E. Stomata with striate cuticula in abaxial side (*A. phytolaccifolium* var. *phytolaccifolium*, Henderson 5653). F. Stomata with striate cuticula in adaxial side (*A. phytolaccifolium* var. *phytolaccifolium*, Henderson 5653). Further explanations in the text. Scale bars: A–B, D–F = $50 \mu\text{m}$; C = $10 \mu\text{m}$.

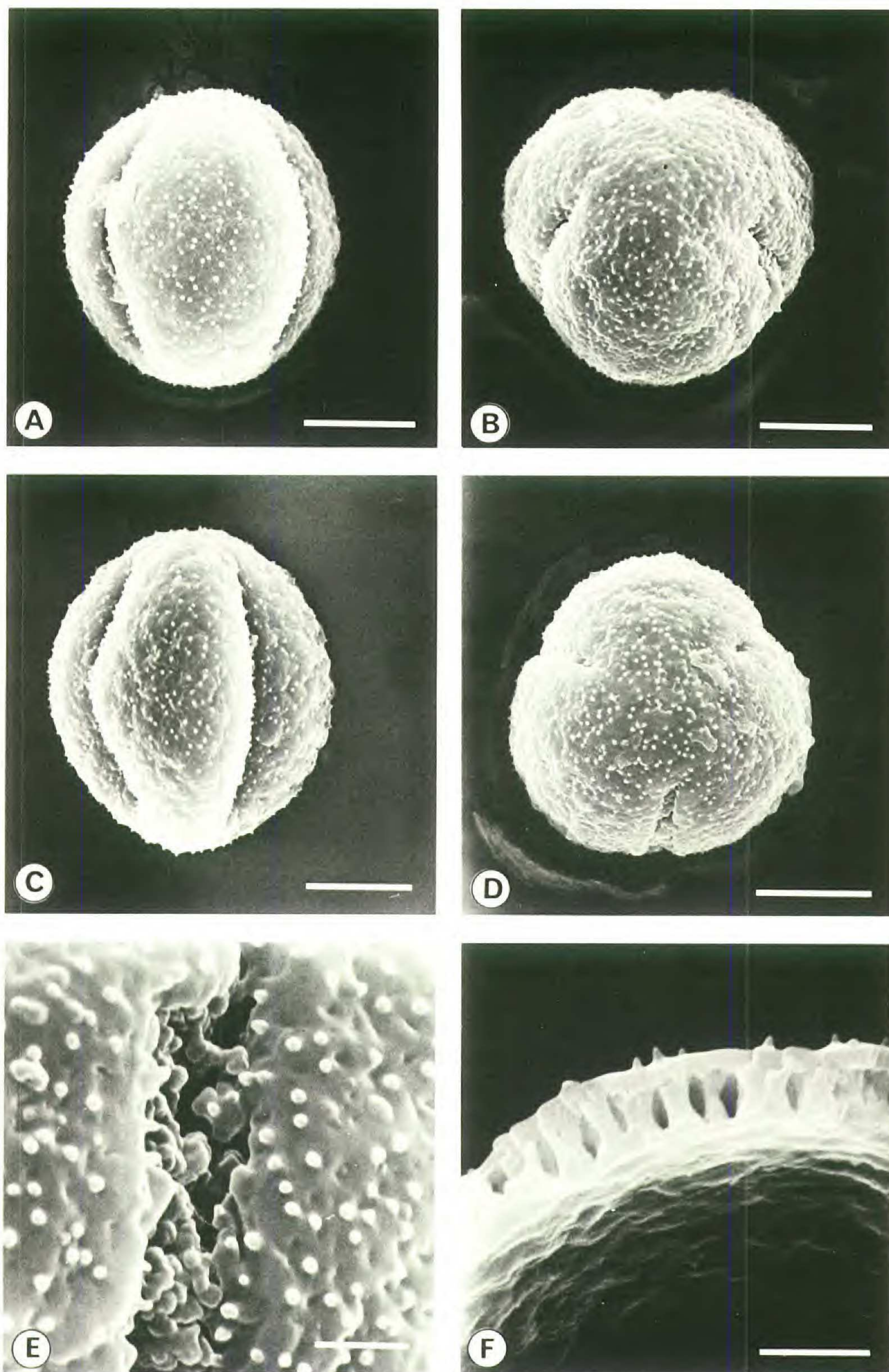


Figure 2. SEM photographs of acetolyzed pollen grains of North American *Aconogonon* spp. **A.** Equatorial view (*A. hultenianum* var. *hultenianum*, Porsild 347). **B.** Polar view (*A. phytolaccifolium* var. *phytolaccifolium*, Steward & Steward 6792). **C.** Equatorial view (*A. davisiae* var. *davisiae*, Gillett 310). **D.** Polar view

is re-evaluated using the SEM. Pollen grains of the North American species can be described as follows: Pollen grains 3-colpate, mostly prolate-spheroidal, rarely spherical or prolate (Figures 2A and 2C). P (polar axis) = 27.6–31.2 μm (the pollen grains of *Aconogonon hultenianum* are slightly smaller than those of the other species), E (equatorial diameter) = 24.8–27.3 μm , P/E = 1.1–1.3. Amb circular (Figures 2B and 2D). Colpi 19.0–20.6 μm , quite narrow. Exine 2.6–3.6 μm thick, sometimes slightly thinner at the equator (in *A. hultenianum* the exine is slightly thicker than that of the other species). Exine structure tectate, punctate or somewhat foveolate with scattered microspinules, the surface often slightly irregularly bulging (Figure 2E). Columellae regularly distributed, more or less densely packed (Figure 2F).

TAXONOMIC TREATMENT

Aconogonon (Meisn.) Reichb., Handb. Nat. Pflanzensyst. 236. 1837 [*Aconogonum* (Meisn.)]. *Polygonum* sect. *Aconogonon* Meisn., Prodr. Polygon. 43 & 55. 1826. *Polygonum* subgen. *Aconogonon* (Meisn.) Small, Mem. Dept. Bot. Columbia Coll. 1: 20. 1895. *Polygonum* sect. *Aconogonum* (Meisn.) Aschers. & Graebn., Synop. Mitteleurop. Fl. 840. 1913 (*Acontogonum*). *Persicaria* sect. *Aconogonon* (Meisn.) H. Gross, Bull. Géogr. Bot. 23: 27. 1913. *Aconopogon* Nakai ex Mori, Enumer. Pl. Cor. 129. 1922, *orth. mut.* TYPE: *Aconogonon divaricatum* (L.) Nakai ex Mori (= *Polygonum divaricatum* L.), designated by Roberty & Vautier, Boissiera 10: 40. 1964.

Polygonum **Polygonum* L., Sp. Pl. 362. 1753, *pro parte*.

Gononcus Raf., Fl. tellur. 3: 16. 1837 ("1836"). TYPE: *Gononcus undulatus* Raf. (fide Farr et al., Index Nom. Gen. 1: 738. 1979).

Pleuropteropyrum H. Gross, Bull. Géogr. Bot. 23: 7. 1913. TYPE: *Pleuropteropyrum weyrichii* (Fr. Schmidt) Gross (= *Polygonum weyrichii* Fr. Schmidt), designated by Roberty & Vautier, Boissiera 10: 53. 1964.

Ampelygonum Lindl., Bot. Reg. 63. 1838, *pro parte*.

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(*A. davisiae* var. *davisiae*, Heller 12614). E. Surface pattern (*A. phytolaccifolium* var. *phytolaccifolium*, Steward & Steward 6792). F. Fractured exine (*A. davisiae* var. *davisiae*, Gillett 310). Scale bars: A–D = 10 μm ; E–F = 5 μm .

Mostly erect herbaceous perennials, 10–150 (–200) cm tall; stem terete to slightly angular, simple or somewhat branched, rarely zigzag, glabrous to pubescent; rhizomatous, often forming thick, elongated woody stocks rooting adventitiously; leaves alternate, mostly cauline, simple, sessile to long-petioled, margin usually entire or sometimes slightly undulate, usually ciliate or scabrous, rarely smooth without hairs, blades narrow lanceolate to ovate, acute to long-acuminate or rarely obtuse at the apex, with rounded or truncate, sometimes cuneate bases; ochrea membranous, funnel-shaped, easily torn, often keeping the tubular shape, glabrous to pubescent, marginal cilia absent; inflorescences terminal, subterminal or sometimes also axillary, small fascicles borne singly, or in short axillary racemes or much branched panicles; flowers usually perfect, or pseudohermaphroditic (female or male part poorly developed), on pedicels subtended by ochrea-like small hyaline bracts (ochreolae), articulate or sometimes unjointed; tepals 5, fused for one-fourth or one-fifth of their length, creamy or greenish or yellowish white, subequal or sometimes unequal (3 larger segments, 2 smaller segments), usually glabrous, ovate to obovate, sometimes spathulate, usually rounded or blunt at the apex, persistent, usually enclosing the achene at maturity, venation of usually 3–5 veins arising from the base; stamens 8, usually included, inserted at the base of the tepals in one or two whorls; filaments filiform, glabrous; anther dorsifixed with 2 longitudinal slits; pollen usually 3-colpate, mostly spheroidal to subprolate; amb usually circular; exine tectate, foveolate or punctate with scattered microspinules; ovary one, unilocular, triangular; style 3-partite, glabrous; stigma capitate; embryo accumbent, usually rounded; achene trigonous or sometimes winged, often ovoid to oval, shiny, smooth, yellowish or darkish brown.

The genus has approximately 25–30 species, which are distributed in the Himalayas, the Far East (China, Japan, Korea, etc.) and U.S.S.R., with one species extending to southeastern Europe and three species occurring in North America. The center of diversity of the genus is in the Himalayas and adjacent regions, which have many endemic species (Hong, in prep.).

Soják (1974) defined three sections within the genus *Aconogonon*: *Aconogonon*, *Smallia* Soják, and *Knorringia* (Czukav.) Soják. According to Soják, two species (*A. newberryi*, *A. davisiae*) from North America belong to the section *Smallia*, while the

remaining species (*A. hultenianum*, *A. phytolaccifolium*) belong to sect. *Aconogonon*.

Tzvelev (1987) defined four sections in his preliminary Far East U.S.S.R. Flora: *Aconogonon*, *Fagopyroides* Tzvel., *Hultenia* Tzvel., *Pleuropteropyrum* (H. Gross) Tzvel. Section *Hultenia* Tzvel. was described on the basis of a North American species, *Aconogonon hultenianum*. Tzvelev (1987) raised sect. *Knorringia* to the rank of genus. This genus does not fit in the tribe Persicariae Dum.; it has been transferred to the tribe Coccolebeae Dum. *emend.* Haraldson, and its generic independence substantiated by Hong (1989). Prior to completing a revision of the genus, I will withhold judgement on infrageneric classifications of North American *Aconogonon*. Therefore, neither Soják's (1974) nor Tzvelev's (1987) infrageneric classifications are applied here.

KEY TO THE NORTH AMERICAN SPECIES OF *ACONOOGONON*

1. Plant usually 10–40 cm tall; inflorescences of short, 3–4-flowered terminal racemes or fascicles in leaf axils; leaves oblong-ovate or ovate, rarely broadly lanceolate to oblong, up to 9 cm long, subsessile or sessile, or with petioles up to 15 mm long; achenes not winged 3. *A. davisiae*
1. Plant usually (50) 60–120 (–200) cm tall; inflorescences much-branched panicles, terminal or subterminal, sometimes also axillary; leaves ovate to lanceolate or narrowly lanceolate, more than 9 cm long, petioled; achenes winged 2
2. Achenes 2.6–3.2 (–3.5) mm long, with three thin, membranous wing-like structures, mostly included or slightly exserted from the tepals at maturity; inflorescences much-branched, with copious flowers, mostly terminal with only bracteate panicles, rarely a few axillary ones; peduncles pubescent; pedicels 0.5–0.9 mm long in articulate ones 1. *A. hultenianum*
2. Achenes 3.8–7.0 mm long, three-angled with three hard, wing-like structures, half or one-third exserted from the tepals; inflorescences terminal, subterminal and often axillary, leafy to merely bracteate, loose panicles; peduncles glabrous; pedicels (0.9) 1.0–1.7 mm long in articulate ones 2. *A. phytolaccifolium*

1. **Aconogonon hultenianum** (Yurtz.) Tzvel., Novit. Syst. Plant Vasc. 24: 77. 1987.

Perennial herb, 50–150 cm tall; stem simple or with few branches, erect, glabrous to densely and retrorsely hairy, 3–14 mm in diameter; leaves cauline, narrowly lanceolate to ovate, 5.0–19.5 × 2.0–8.0 cm, long-acuminate, rarely short-acuminate, with rounded-obtuse, rarely subcordate or truncate base, glabrous to pubescent on both sides; margin entire or slightly undulate, ciliate or rarely smooth; petiole glabrous to pubescent, 0.8–3.5 (4.0) mm long; ochrea 1.0–2.2 cm long, membranous, pilose to glabrescent, easily torn; inflorescences usually terminal, sometimes also axillary, with many flowers, panicles leafy to leafless; peduncles pubescent, very rarely glabrous; pedicels glabrous, 0.5–0.9 mm long (in fruit up to 1.9 mm), articulate; flowers hermaphroditic; tepals unequal or sometimes subequal, deeply incised, creamy white, obovate, 1.9–3.8 × 0.9–1.7 mm long; stamens included; filaments (0.5) 0.6–1.0 mm long; anthers ca. 0.3 mm long; ovary ovate; style ca. 0.3 mm long (including stigma); stigma capitate, ca. 0.1 mm in diameter; achene with three very thin, membranous wings, normally ovate, pale brownish or greyish brown, shiny, 2.6–3.8 × 1.4–2.0 mm, included or slightly exserted above the tepals.

Aconogonon hultenianum is related to *A. tripterocarpum* (A. Gray) Hara from E Siberia, but differs in its ovate-lanceolate and larger leaves, pubescent ochreae and peduncles, much-branched panicles with many flowers, larger tepal lobes, by having the fruits held erect, and by its much smaller and thin-membranous winged achenes. *Aconogonon hultenianum* may be confused with *A. phytolaccifolium*, although they are not closely related. *A. hultenianum* can be distinguished from *A. phytolaccifolium* by its smaller achenes with thin membranous wall structure, and by its much branched panicle with pubescent peduncle, many flowers and somewhat shorter pedicels.

KEY TO THE VARIETIES OF *ACONOGONON HULTENIANUM*

1. Leaves glabrous on both sides; stem usually glabrous, rarely with a few hairs below the nodes . . . **1a.** var. *hultenianum*
1. Leaves pubescent on both sides; stem usually retrorsely hairy. **1b.** var. *lapathifolium*

- 1a. ***Aconogonon hultenianum*** (Yurtz.) Tzvel. var. ***hultenianum***. *Polygonum alaskanum* ssp. *hultenianum* Yurtz., Bot. Zurn. 59: 1452. 1974. *Aconogonon alaskanum* ssp. *hultenianum* (Yurtz.) Soják, Čas. Nár. Muz. (Prague). 150: 137. 1982. TYPE: Alaska, Fairbanks area, roadside, College Road, near Ft. Caribou, 64°50'N, 147°50'W, July 16, 1962, N. L. Simmerman 147 (HOLOTYPE: LE, not seen; ISOTYPE: GH!). [Nomenclatural Note: This species has previously generally been called *Aconogonon alaskanum* (Small) Wight, but the basionym of this, *Polygonum alpinum* var. *alaskanum* Small (1895) is superfluous, as an earlier legitimate name, *P. alpinum* var. *lapathifolium* Cham. & Schlechtend., was cited in synonymy (see also Kartesz and Gandhi, 1990). The only other name available for the species as circumscribed here is *A. hultenianum* (Yurtz.) Tzvel.]

Polygonum alaskanum var. *glabrescens* Hultén, Lunds Univ. Årsskr. N. F. Avd. 2. Bd 40 (no. 1). 4: 612. 1944. TYPE: U.S.A., Alaska, Bonanza Creek, June 19, 1924, Eastwood 298 (HOLOTYPE: GH!; ISOTYPES: CAN!, UC!: 2 sheets, US!). *P. alaskanum* var. *laevimarginatum* Porsild, nom. tant. [Note: Porsild (1943, 1951) recognized this variety in the Mackenzie Delta area, and even designated a type collection (Porsild 7295, in CAN, GH, S). It seems, however, that the name was never validly published.]

Stem usually glabrous or rarely with a few hairs below the nodes; leaves ovate to narrowly lanceolate, 6.0–17.0 (19.5) × 2.1–7.0 (8.0) cm, glabrous on both sides, entire, ciliate or sometimes smooth at the margin; petiole glabrous or glabrescent, 0.8–2.5 mm long; peduncle usually pubescent mainly at nodes. Chromosome number: $2n = 20$ (Bowden, 1966).

ILLUSTRATIONS. Figure 2A (pollen); Figure 3 (map).

REMARK. Two collections, Macoun 91284 and Sims 6057 from Yukon, are totally glabrous.

ECOLOGY AND DISTRIBUTION. Common in moist hillsides, waste places, stream banks, sandy lake shores, and on talus slopes above tree-line. It is often associated with *Calamagrostis*, *Salix* and *Luzula* spp. Var. *hultenianum* is distributed in Alaska, in the United States and in the Yukon Territory and western part of the Northwest Territories of Canada (Figure 3). The known altitudinal range is 250–1700 m.

USE. The young stems and leaves are edible and provide an acceptable substitute for fresh rhubarb (Porsild and Cody, 1980: 262).

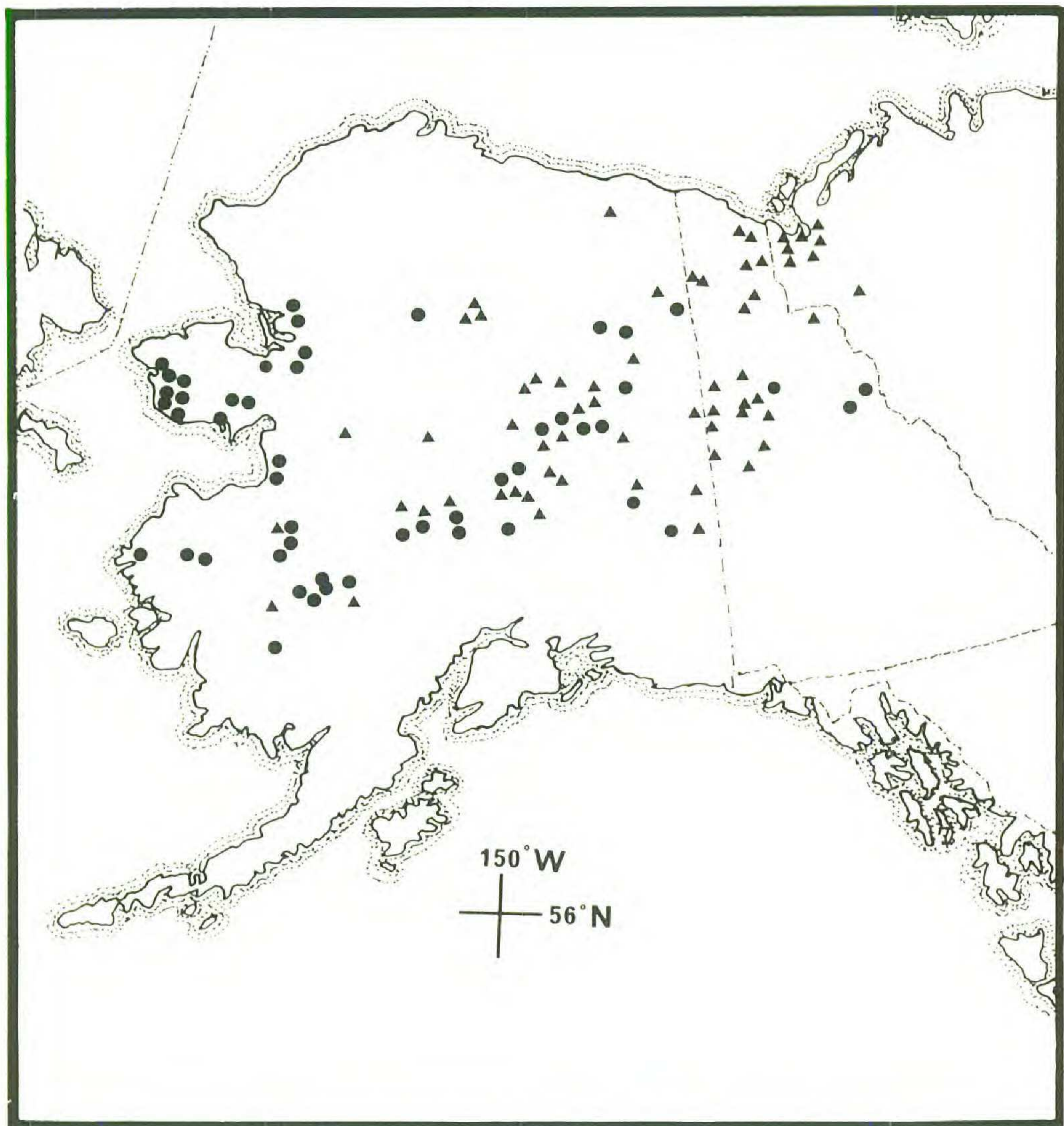


Figure 3. Known distribution of *Aconogonon hultenianum* var. *hultenianum* (▲) and var. *lapathifolium* (●).

REPRESENTATIVE SPECIMENS. CANADA. **Northwest Territories:** Lower Mackenzie River Distr., Mts. Conoe Lake, W of Aklavik, *Hultén s.n.* (A: 2 sheets, s); *ibid.*, East branch, *Porsild 7295* (CAN, GH, s); ca. 3 miles E of Mackenzie River East Channel, *Sims 6053* (UBC). **Yukon Territory:** Dawson, *Anderson 1589* (NY); *Calder & Billard 3729* (GH, MO); the Yukon Valley, 2 miles below Sheep Creek, *Collier 158* (us); Klondike River, *Gorman 1161* (CAN, NY, s, us); N of Bonanza Creek, *Macoun 91284* (CAN, NY); Rampart House, *Loan 501* (UC); Ogilvie Mts., along Dempster Rd., *Porsild 347* (CAN, GH, UBC); vicinity of camp on Henry Creek, 61°47'N, 138°50'W, *Raup et al. 13515* (A, CAN); N side of Bell River, First terrace, at Lapierre House, 67°23'N, 136°56'W, *Welsh & Rigby 12218* (CAN, NY).

UNITED STATES. **Alaska:** Livengood, *Anderson 8989* (GH); Circle, *Bayne Beachamp Exped. 53* (UC); SE of Northway on Alaska Hwy., *Dempster 1291* (UC); Mt. McKinley Nat'l Park Station, *Dixon 54* (UC, us); vicinity of Wonder Lake, 63°27'N, 150°50'W, *Viereck 1594* (GH, s), *Nelson & Nelson 3871* (GH, MO,

NY, UC, US); Kuskokwim River Drainage, Canoe Mt., *Drury 1863* (CAN, GH); Yukon Valley, near Poston, Forty Mile Creek, *Funston 154* (GH, K, MO, NY, S, US); Red Rock Campground, W of Central, 65°30'N, 145°W, *Harms 2759* (GH); N of Fairbanks, at summit of Roundhouse, *Harshberger s.n.* (US); Hot Springs on the Tanana River, *Hitchcock s.n.* (US); Yukon River, 30 miles above Nulats, *Hollich s.n.* (NY); Koyukuk River, Middle Fork, Bettles, *Jordal 2452* (S, US); Rampart, *Jones 45* (US: 2 sheets); N of Fairbanks, *Purer 7609* (US); Valley of Alatna River, ca. 20 miles above the mouth, *Mendenhall s.n.* (US); between Yukon River and Nation River, 65° to 65°30'N, 141° to 142°W, *Mertie 8* (US); Kokrines Mts., N side of divide towards Melozitna River, *Porsild & Porsild 722* (CAN, S, GH); S side of Tanana River Valley, 63°45'N, 138°43'W, *Raup & Raup 12672* (A, CAN, S, UBC); N slopes of Nutzotin Mts., 63°23'N, 143°45'W, *Raup & Raup 12789* (A, CAN, S); NW of McGrath, in the Upper Kuskokwim Valley, *Scamman 1838* (GH); Lower Yerrick Creek, *Spetzman 790* (US); 28 miles S of Delta Junction, along the Delta River, *Taylor et al. 19202* (NY).

- 1b. ***A. hultenianum* var. *lapathifolium*** (Cham. & Schlechtend.) S.-P. Hong *comb. nov.* *Polygonum alpinum* var. *lapathifolium* Cham. & Schlechtend., *Linnaea* 3: 38, 1828. *P. polymorphum* var. *lapathifolium* (Cham. & Schlechtend.) Ledebour, *Fl. Ross.* 3: 518. 1850, *nom. illegit.* TYPE: Alaska, Bering Strait, Kotzebue's Sound, not dated, *Chamisso and Beechey s.n.* (NEOTYPE: K!, designated here). [Note: The original type localities of *Polygonum alpinum* var. *lapathifolium* are Chamisso Is. and Eschscholtz Bay in Alaska. However, I failed to trace any original material in B and LE. The neotype is from the same area as the original material and was cited by Hooker (1840) as *P. alpinum* var. *lapathifolium*.]

Polygonum alpinum var. *alaskanum* Small, *Mem. Dept. Bot. Columb. Coll.* 1: 33. 1895, *nom. illegit.* *P. alaskanum* (Small) Wight ex Hultén, *Lunds Univ. Årsskr. N. F. Avd. 2. Bd 40* (no. 1). 4: 610. 1944, *nom. illegit.* *P. alpinum* spp. *alaskanum* (Small) Welsh, *Great Basin Natur.* 28:154. 1968, *nom. illegit.* *P. polymorphum sensu* J. Macoun, *Cat. Canad. Pl.* 3: 412. 1886, non Ledebour, *Fl. Ross* 3: 518. 1850.

Aconogonon phytolaccifolium sensu Sharples, *Alas. Wild. Fl.* 4. 1938, non Rydberg, *Fl. Rocky Mts.* 238. 1917.

Stem pubescent with mostly retrorse hairs; leaves lanceolate to narrowly lanceolate, 5.0–16.8 × 2.0–6.0 cm, pubescent on both sides, entire, ciliate; petiole pubescent, 0.8–3.5 (4.0) cm long; peduncle densely pubescent. Chromosome number: $2n = 20$ (cf. Bowden, 1966; Dawe and Murray, 1979).

ILLUSTRATIONS. Anderson, 1959: 223, plate 18, Figure 394; Polunin, 1959: 156; Hultén 1968: 386; Porsild and Cody 1980:

265, Figure 399. All are *sub nomine Polygonum alaskanum*. Figures 1A and 1B (epidermal anatomy); Figure 3 (map).

ECOLOGY AND DISTRIBUTION. *A. hultenianum* var. *lapathifolium* occurs on montane slopes above the treeline, steep hillsides, steep cut banks or on sandy loam of rivers. Known from Alaska in the United States and in the Yukon Territory of Canada (Figure 3). According to Scoggan (1978) this variety may occur in the mountains of British Columbia in Canada, but no collections from that area are known to me. It was also reported from Chukotskiy peninsula in the U.S.S.R. by Tzvelev (1989), but I have not seen material from this area. The known altitudinal range is 100–1300 m.

VERNACULAR NAMES. 'Miner's greens,' 'Wild rhubarb' in Alaska.

REPRESENTATIVE SPECIMENS. CANADA. **Yukon Territory:** Canol Rd., SE slopes of Mt. Sheldon, *Porsild & Breitung 11719* (GH, NY, s, UC, US); 10 miles SW of Macmillan Pass, 63°12'N, 130°07'W, *Coly & Brigham 20544* (UBC).

UNITED STATES. **Alaska:** Anvik, *Chapman 12* (GH); Aniak Region, 61°37'N, 159°30'W, *Drury 1437* (GH); Kuskokwim River Drainage Basin, *Drury 1753* (GH), *Layden 52* (US); Morainic till near Farewell Lake, *Drury 2433* (GH); Limestone Mts., SE of Farewell, 62°28'N, 153°50'W, *Drury 2821* (GH); 16 miles W of Nome, *Flett 1574* (US); between Cook Inlet and the Tanana River, *Glenn s.n.* (US); Noorvik, on the Kobuk River, *Scamann 6345* (GH); Upper Kobuk River, Selby Lake, *Hultén s.n.* (A: 4 sheets, s); Norton Sound, vicinity of Unalakleet, *Johnston & Palmer 48* (GH, US); Rocky Point, *Mason s.n.* (K, s: 2 sheets, UC); Kuskokorin Valley, *Meimann s.n.* (GH); McKinley Nat'l Park, N end of Wonder Lake, *Mexia 2163* (GH, MO, NY, s, UC, WTU); Buckland River, *Miller 55c* (US), *Palmer 209* (GH, US); Circle Hot Springs near Steese Hwy. ca. 138 miles N of Fairbanks, *Scamann 151* (GH); Bering Strait, Teller, on Port Clarence, *Scamann 5470* (GH); vicinity of Port Clarence, bank of Tuksuk Channel, *Walpole 1606* (US); near Mary's Igloo, *Walpole 1647* (US); near Fairbanks, *Batten 87-3* (ALA, UPS).

2. *Aconogonon phytolaccifolium* (Meisn. ex Small) Rydb., Fl. Rocky Mts. 238. 1917.

Perennial herb, 70–150 cm tall, sometimes up to 200 cm high; stem simple or usually branched above, erect, usually glabrous or sometimes pubescent, rarely only in the lower part; roots thick, large and somewhat woody, sometimes more than 5 cm in diameter; leaves cauline, lanceolate to ovate-lanceolate, 5.0–15.0 × 1.4–7.5 cm, acute or acuminate, often obtuse at the apex, more or less rounded at the base, entire, ciliate or scabrous, sometimes totally hairless, often with revolute margins, usually glabrous

to weakly hairy, sometimes densely pubescent on both sides; petiole glabrous to pubescent, 0.5–3.0 (3.7) mm long, upper leaves usually sessile; ochrea roughly 1–3 cm long, membranous, usually pubescent, sometimes totally glabrous or pubescent only following veins, easily torn; inflorescences usually terminal, subterminal and axillary, leafless to leafy-bracteate with a few branched panicles; peduncles glabrous; pedicels glabrous, articulate or often non-articulate in fruit, (0.9) 1.0–1.7 mm long in articulate ones, (1.6) 1.9–3.5 mm long in non-articulate ones; flowers usually hermaphroditic, rarely pseudo-hermaphroditic (usually stamens poorly developed); tepals usually subequal, ovate to obovate, 2.2–3.2 × 0.9–1.8 mm long (up to 3.8 mm in fruit); filaments 0.8–1.2 (1.7) mm long; anthers 0.3–0.4 mm long; ovary ovate, trigonous, styles ca. 0.4 (0.5) mm long (including stigma); achenes three-angled with three hard, wing-like structures, ovoid, mostly yellowish-brown, smooth, shiny, 3.8–7.0 mm long, usually half- or one-third exserted from the tepals.

As Hitchcock et al. (1964: 161) mentioned, in a high proportion of the collections from Idaho, Montana, eastern Oregon, and parts of Nevada, plants are glabrous to glabrescent throughout and the pedicel is usually non-articulate. On the other hand, most of the collections from California and Washington have a tendency towards pubescent, more ovate leaves and often articulated pedicels.

Kongar (1973) described *Polygonum smallii* on the basis of the size of achenes, presence/absence of a jointed pedicel in the fruiting stage, and leaf shape. His treatment is not followed here, since these characters show continuous intergradation. In some collections (e.g., *Baker 1379*, *Eastwood 1878*, *Morris 1038*, *Tracy 12921*), specimens are slightly smaller, and the triquetrous shape of the achenes is less pronounced. The pedicel is not always jointed at the middle or beneath the tepals. *P. smallii*, therefore, is treated as a synonym of *Aconogonon phytolaccifolium*.

In North America *Aconogonon phytolaccifolium* has been confused with the Asian species *A. alpinum* (All.) Schur. The two species are similar in general morphology, but the former differs from the latter in its usually much broader leaves, much shorter petiole, its loose panicles, in having half or one-third of the achene exserted from the tepals, and its triquetrous, three hard, wing-like structures, brownish, shiny achene. One deviating group is here recognized as a taxonomic variety.

KEY TO THE VARIETIES OF *ACONOGONON PHYTOLACCIFOLIUM*

1. Plants glabrescent to pubescent; leaf margin always ciliate . . .
 **2a.** var. *phytolaccifolium*
1. Plants totally glabrous throughout; leaf margin eciliate, often
 somewhat revolute **2b.** var. *glabrum*

2a. *Aconogonon phytolaccifolium* (Meisn. ex Small) Rydb. var. *phytolaccifolium*. *Polygonum phytolaccifolium* Meisn. ex Small (as "*phytolaccaefolium*"), Bull. Torrey Bot. Club 19: 360. 1892. TYPE: U.S.A., California, without date, *Cuming 229* (HOLOTYPE: NY, photo!; ISOTYPE: NY, photo!).

Polygonum smallii Kongar, Bot. Zurn. SSSR 57: 1337. 1973, *syn. nov.* *Aconogonon smallii* (Kongar) Soják, Čas. Nár. Mus. 150: 137. 1982. TYPE: U.S.A., Idaho, Valley Co., granite slopes of Gold Fork Lookout Payette Nat. Sawtooth Mts., 8000', July 9, 1937, *Thompson 13744* (HOLOTYPE: LE!; ISOTYPES: GH!, NY!, s!, UC!: 2 sheets, WTU!).

Polygonum polymorphum var. *foliosum* R. Keller, Bull. Soc. Bot. Belg. 30: 49. 1891. *P. alpinum* var. *foliosum* (R. Keller) Small, Bull. Torrey Bot. Club 19: 360. 1892. TYPE: U.S.A., Washington, Mt. Adams, August 1882, *Ph. J. Howell s.n.* (?ISOSYNTYPES: MO! NY!: 3 sheets, US!, WTU!).

P. alpinum auct. Amer., non All., Misc. Taur. 5: 94. 1773.

P. polymorphum auct. Amer., non Ledeb., Fl. Ross. 4: 521. 1850.

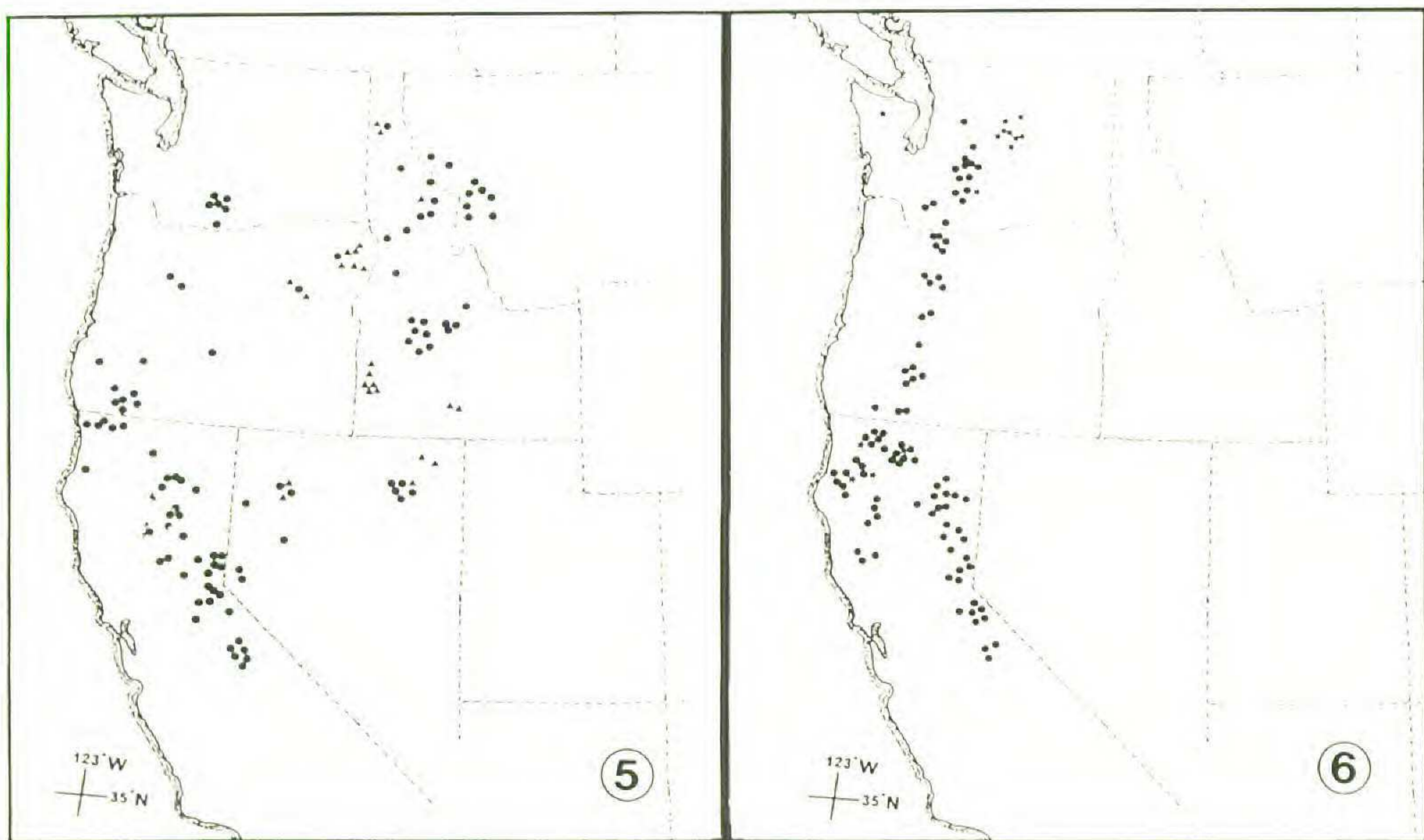
Stem glabrous to pubescent; leaves 5.0–15.0 (19.0) × 1.4–7.4 cm, ciliate or scabrous, usually glabrescent to pubescent on both sides; petiole glabrous to pubescent, 0.4–2.5 (–3.7) cm long; ochreae usually glabrescent to pubescent, sometimes hairy only on the veins, easily torn, 1–3 cm long; pedicels usually articulate, or sometimes not forming articulation, 0.9–1.8 mm long (in articulate ones), 2.2–3.5 mm long (in non-articulate ones).

ILLUSTRATIONS. Small, 1895: 35, plate 4; Abrams, 1944: 64, Figure 1467; Hitchcock et al., 1964: 164. All are *sub nomine Polygonum phytolaccifolium*. Figures 1E and 1F (epidermal anatomy); Figures 2B and 2E (pollen); Figure 5 (map).

ECOLOGY AND DISTRIBUTION. Var. *phytolaccifolium* grows on moist or sometimes dry rocky granitic slopes; it is common in alpine meadows, and sometimes along streams or in wet spots. It is associated with *Stipa occidentalis* Thurb. ex Wats, *Abies magnifica* Murr., and *Pinus contorta* Dougl. ex Loud. It occurs in Washington, Idaho, Montana, Oregon, California and Nevada in the United States (Figure 5). The known altitudinal range is 1200–3100 m.



Figure 4. Holotype specimen (GH) of *Aconogonon phytolaccifolium* var. *glabrum*.



Figures 5 and 6. Known distribution of *Aconogonon* in North America. 5. *A. phytolaccifolium* var. *phytolaccifolium* (●) and var. *glabrum* (▲). 6. *A. davisiae* var. *davisiae* (●) and var. *glabrum* (★).

VERNACULAR NAME. It is called 'Ragweed' by the cattleman (fide *Alexander & Kellogg 5808*).

REPRESENTATIVE SPECIMENS. UNITED STATES. California: Alpine Co.: without precise locality, *Hansen s.n.* (UC). Amador Co.: Silver Lake, *Hansen 314* (κ, MO, UC). Butte Co.: Jonesville, *Copeland 628* (GH, κ, MO, MU, NY, S, UC); bank of a stream at Chaparral, *Heller 15278* (MO: 2 sheets, NY, S, UC, US, WTU). Del Norte Co.: Siskiyou Mts., Indian Creek, *Jepson 18565* (JEPS). Eldorado Co.: Tahoe Tavern, *Blake 10306* (GH); Pyramid Peak, *Hall & Chandler 4758* (UC). Humboldt Co.: Grouse Mt., *Tracy 12921* (GH, UC). Nevada Co.: Donner Lake towards Donner Pass, *Heller 7123* (GH, MO, NY, UC, US); Soda Springs, *Jones 2613* (BM). Placer Co.: Mt. Lincoln, south of Summit Valley, *Heller 12934* (GH, MO, NY, UC); near Donner Pass, *Torrey 425* (GH). Plumas Co.: Lassen Peak, *Austin 154* (MO, UC, US); Morgans Springs, *Eastwood 1878* (GH, NY, UC). Sierra Co.: North Fork Yuba River, Pioneer Road Station, *Jepson 16797* (JEPS: 2 sheets). Siskiyou Co.: Marble Mts., Paradise Lake, *Alexander & Kellogg 5808* (κ, US, WTU); E side of Hancock Lake, *Oettinger 437* (UC). Tuolumne Co.: Yosemite Valley, *Abrams 4678* (GH, NY), *Brewer 1670* (GH, US). **Idaho:** Adams Co.: Black Lake, *Weiser, Christ 8703* (NY). Blaine Co.: Sawtooth Primitive Area, NW of Alturas Lake, Alpine Creek, *Hitchcock & Muhlick 10445* (NY, WTU). Boise Co.: Pilot Peak, ca. 10 miles SW of Lowman, *Hitchcock & Muhlick 9913* (GH, NY, UC, WTU). Custer Co.: Mt. Heybuon, Sawtooth Range, *Thompson 13668* (MO, NY, US, WTU). Elmore Co.: Trinity Mts., above Big Trinity Lake, *Baker 11183* (NY); Trinity Lake, ca. 10 miles W of Featherville, *Hitchcock & Muhlick 10397* (NY, UC, WTU); near Big Roaring River Lake, 20 miles N of Pine, *Meyer & Meyer 2274* (MO, NY, S, UC). Idaho Co.: Selway Mts., Fog Mt. Saddle, *Baker 15297* (NY, WTU). Kootenai Co.: Wiesner's Peak, *Sandberg 662* (GH, κ, NY, US). Shoshone Co.: Bullion, along Idaho State Line, *Baker 13447* (NY, WTU). Valley Co.: NW of McCall, Payette Lakes, E slope of Mt.

Brundage, *Baker 10276* (NY, WTU); E side of Divide between Warm Lake and Cascade, *Hitchcock & Muhlick 14032* (NY, UC, WTU). **Montana:** Granite Co.: Burnt Fork Trail, Skalkaho Rd., *Hitchcock & Muhlick 14491* (NY, WTU). Mineral Co.: above Hoodoo Pass, *Mooar 13839* (NY). Ravalli Co.: Bitterroot Mts., 1 mile E of St. Mary's Peak, *Hitchcock & Muhlick 15301* (MO, NY, UC, WTU). **Nevada:** Elko Co.: Ruby Range, S ridge above Island Lake, *Maguire & Holmgren 22604* (GH, NY); Ruby Mts., Verdi Peak, *Mills & Beach 1589* (UC). Ormby Co.: Clear Creek Canyon, *Baker 1379* (GH, MO, NY, UC, US). Washoe Co.: Crason Range, Ophir Creek, *Pinzl 3781* (NY). **Oregon:** Baker Co.: Wallowa Mts., near Cornucopia, *Thompson 13324* (GH, NY, UC: 2 sheets, US, WTU). Grant Co.: Blue Mts., John Day Valley, *Henderson 5653* (GH, MO). Josephine Co.: 3 miles E of Oregon Cave, on Lake Mt. trail, *Hitchcock & Martin 5132* (GH, UC, WTU), *Thompson 12442* (GH, NY, UC, US, WTU: 2 sheets). Lane Co.: below Fairview Lookout, *Powell s.n.* (UC, WTU). Linn Co.: Tombstone Prairie, *Steward & Steward 6792* (GH, s). Wallowa Co.: Aneroid Lake Trail, *Kruckeberg 2261* (NY, s, UC, WTU). **Washington:** Klickitat Co.: Cascade Mts., White Salmon, *Lloyd s.n.* (NY). Yakima Co.: Mt. Adams, *Howell 1546* (US); *ibid.*, Wodan's Vale, *Suksdorf 6366* (GH, MO, NY, WTU); Mt. Paddo, *Suksdorf 6851* (GH), *1414* (NY).

2b. ***Aconogonon phytolaccifolium*** (Meisn. ex Small) Rydb. var. ***glabrum*** S.-P. Hong *var. nov.* TYPE: United States, Oregon, Wallowa Mts., 7–8000', July 16, 1900, *Cusick 2442* (HOLOTYPE: GH!; ISOTYPES: JEPS!, K!, MO!, NY!, US!).

Plerumque formae typicae similis sed planta omnino glaberrima differt.

Stem totally glabrous; leaves 5.4–12.5 × 1.6–4.8 cm, usually obtuse, more or less revolute, eciliate, totally glabrous on both sides; petiole 0.5–1.2 (1.6) cm long, glabrous; ochrea totally glabrous, 1.0–2.2 cm long. Pedicels usually non-articulate, very rarely articulate, (1.1) 1.6–3.2 mm long; achene 4.8–6.1 (7.0) × 2.8–4.2 (4.5) mm.

ILLUSTRATIONS. Figure 4 (holotype); Figure 5 (map).

ECOLOGY AND DISTRIBUTION. Usually in sandy patches, in dry or sometimes moist rocky slopes, often associated with *Abies lasiocarpa* (Hook.) Nutt., and *Picea engelmannii* Parry ex Engelm. Var. *glabrum* is distributed in Idaho, Nevada, and Oregon in the United States. Only one collection (*Grinnell s.n.* in JEPS) is known so far from California (Figure 5). The known altitudinal range is 1800–3350 m.

USE. In Oregon, this plant is eaten by sheep apparently in preference to the grass (*vide Shear 1765*).

REPRESENTATIVE SPECIMENS. UNITED STATES. **California:** Tehama Co.: Brokeoff Mt., *Grinnell s.n.* (JEPS). **Idaho:** Adams Co.: 3 miles S of Goose Lake,

Baker 11719 (NY, WTU). Benewah Co.: St. Joe Baldy, *Christ 5010* (NY). Blaine Co.: above W side of Alturas Lake, *Cronquist 2625* (GH); Coeur d'Alene Mts., *Leiberg 1195* (GH, K, MO, NY, UC). Idaho Co.: Seven Devils Mts., Seven Devils Camp, *Baker 12015* (NY, WTU); Bitterroot Mts., Lora Trail Road, near Rocky Ridge Lookout, *Sharsmith 4054* (GH, MO, NY, S, UC). Owyhee Co.: near headwaters of Sawpit Creek, ca. 3 miles SW of Silver City, *Baker 7895* (NY); Silver City, *Macbride 430* (GH, NY, UC, US, WTU); 45 miles E of Pierce, along Lolo Trail Rd. to Powell, *Hitchcock & Muhlick 21915* (NY, UC, WTU). Shoshone Co.: Grizzly Peak, *Christ 3595* (NY); 2–3 miles W of Quarles Peak, *Wilson 213* (GH, MO, UC). **Nevada:** Elko Co.: Angel Lake, ca. 13 miles SW of Wells, *Morris 1038* (GH, NY); Ruby Mts., S slope Lamoille Canyon, opposite Ranger Station, *Train 4563* (NY, UC); E Humboldt Mts., *Watson 1071* (GH: 2 sheets, NY, US). **Oregon:** Grant Co.: Blue Mts., divide S of Anthony Lakes, *Hitchcock 19708* (UC, WTU). Union Co.: Cove Mts., Cove-Minam trail, *Cusick 3737* (WTU). Wallowa Co.: Wallowa Mts., Hudsonian Lake Basin, at edge of Mirror Lake, *Constance & Jacobs 1334* (UC, WTU); 6 miles above Wallowa Lake, *Shear 1765* (US); Imnaha Nat'l Forest, Stanley Range, *Sampson & Pearson 135* (US).

3. **Aconogonon davisiae** (Brewer ex A. Gray) Soják, *Preslia* 46: 151. 1974.

Perennial herb, 12–42 (50) cm tall; stems usually several, simple to freely branched, mostly erect, slightly angular, pubescent with soft or sometimes scabrous hairs to glabrous; leaves broadly or rarely narrowly lanceolate to oblong, oblong-ovate or ovate, 2.1–7.5 (9.7) × 1.0–5.0 cm, sometimes sublustrous on both sides, especially in glabrous specimens, acute or sometimes obtuse at the apex, usually truncate or rarely cordate at the base, entire, ciliate or scabrous at the margin and glabrous to pubescent on both sides; petiole glabrous to pubescent, 0.3–1.5 mm long, upper leaves often sessile; ochrea 0.3–2.0 (3.0) cm long, tubular, membranous, glabrous to pubescent, usually remaining tubular, sometimes torn; inflorescences short axillary racemes bearing few flowers; peduncles usually glabrous; pedicels glabrous, usually articulate, 0.5–1.9 (2.4) mm long, usually slightly longer in fruiting condition; flowers normally hermaphroditic, rarely pseudohermaphroditic (stamens poorly developed); tepals usually subequal or rarely unequal, the 3 outer ones slightly larger than the inner 2, greenish to pinkish white, oblong-oval to obovate, usually obtuse, 2.0–4.3 × 1.0–2.4 mm; venation of usually 3–4 (5) veins arising from the bases with 2–5 secondary ramifications; stamens 8 (9), included; filaments (0.2) 0.5–1.3 mm long; anthers 0.3–0.7 mm long; ovary ovate, trigonous; style 0.3–0.6 (0.9) mm long (including stigma); achene ovoid or narrowly ovoid, yellowish

brown, smooth and more or less shiny, 4.5–6.0 (8.3) mm long, one-third to one-half exserted from the tepals.

Small (1894) distinguished *Aconogonon davisiae* (as *Polygonum davisiae*) from *A. newberryi* (as *P. newberryi*) on the basis of the length of inflorescence and some other minor characters (petioled or sessile/subsessile leaves, leaf shape, etc.), including their different distributions. Many local floras (e.g., Abrams, 1944; Munz, 1959; Hitchcock et al., 1964) of North America followed this treatment of Small (1894, 1895). After careful investigation, however, the diagnostic characters given appear unreliable. No absolute morphological discontinuities exist in any of these characters. Therefore, it seems necessary to treat *A. newberryi* as a synonym of *A. davisiae*. Two taxonomic varieties are recognized here, distinguished by the presence or absence of indumentum.

KEY TO THE VARIETIES OF *ACONOGONON DAVISIAE*

1. Plants pubescent, rarely glabrescent **3a.** var. *davisiae*
 1. Plants totally glabrous throughout **3b.** var. *glabrum*

3a. *Aconogonon davisiae* (Brewer ex A. Gray) Soják var. ***davisiae***.
Polygonum davisiae Brewer ex A. Gray, Proc. Amer. Acad. Arts 8: 399. 1873. TYPE: U.S.A., California, Sierra Nevada, Alpine Co., Carson Pass, 8200', August 16, 1863, *Brewer 2105* (LECTOTYPE: GH!, selected here; ISOLECTOTYPES: K!, UC!: 2 sheets, US!).

Polygonum newberryi Small, Bull. Torrey Bot. Club 21: 170. 1894, *syn. nov.*
Aconogonon newberryi (Small) Soják, Preslia 46: 151. 1974. TYPE: U.S.A., Oregon, Cascade Mts., at Crater Pass, 7000', growing in scoria near the snow line, September 1, 1856, *Newberryi s.n.* (HOLOTYPE: NY!).

Stem mostly pubescent, rarely glabrous; leaves 2.1–7.5 × 1.1–5.0 cm, usually acute, rarely obtuse, usually rounded or slightly truncate at the base, entire, ciliate or scabrous at the margin, usually rough or soft hairy on both sides, or sometimes glabrescent; petiole usually pubescent, rarely glabrescent, 0.3–17.0 (22.0) mm long, usually sessile or subsessile in the upper leaves; ochrea 0.4–2.0 cm long, pubescent or rarely glabrescent; pedicels 0.5–1.7 (2.4) mm long; tepals 2.1–4.3 × 1.1–2.2 mm; filaments (0.5) 0.8–1.3 mm long; anthers 0.3–0.5 (0.7) mm long; achenes 3.2–5.8 (8.3) mm long. Chromosome number unknown.

ILLUSTRATIONS. Small, 1895: 37, 39, plate 5, *sub nomine Polygonum newberryi*, plate 6, *sub nomine Polygonum davisiae*; Abrams, 1944: 64, Figure 1468, *sub nomine P. newberryi*, Figure 1469, *sub nomine P. davisiae*; Hitchcock et al., 1964: 162, *sub nomine P. newberryi*. Figures 1C and 1D (epidermal anatomy); Figures 2C, 2D and 2F (pollen); Figure 6 (map).

ECOLOGY AND DISTRIBUTION. *A. davisiae* var. *davisiae* is common in steep subalpine slopes, or on volcanic fell fields with large lava blocks. It is often associated with *Abies lasiocarpa* (Hook.) Nutt., *Eriogonum* spp., *Pinus albicaulis* Engelm., *Lupinus* spp., and *Tsuga mertensiana* (Bong.) Carr. This taxon occurs from Washington through Oregon to California in the United States (Figure 6). The known altitudinal range is 1200–3050 m.

REPRESENTATIVE SPECIMENS. UNITED STATES. **California:** Alpine Co.: Big Tree Road, Silver Valley, *Brewer 1955* (UC: 2 sheets, US); Carson Pass, *Mason 12353* (GH, JEPS, K, MO, NY: 2 sheets, UC); Wood Lake region, above Winnemucca Lake, *Peirson 12800* (UC); Markleville, *Yates 3966* (UC). Butte Co.: Jonesville, *Copeland 629* (GH, K, MO, NY, S, UC, US, WTU). Colusa Co.: Snow Mt., West Peak and Cirque, *Heekard & Hickman 5983* (JEPS). El Dorado Co.: above Lois Lake, Rockbound Valley, Wilderness Area, *Robbins 1795* (GH, UC). Humboldt Co.: Trinity Summit, *Davy & Blasdale 5806* (UC); Slamon Summit, *Tracy 14383* (GH, UC). Lake Co.: Snow Mt., West Peak, *Munz 22307* (NY). Lassen Co.: Mt. Dyer, *Austin s.n.* (NY, US). Mariposa Co.: Shasta, *Congdon s.n.* (UC). Mendocino-Teham Co.: Anthony Peak, *Eastwood & Howell 9855* (UC). Nevada Co.: 1 mile N of Castle Peak, *French 523* (UC). Northern Lake Co.: Mt. Hull, *Hall 9537* (UC). Placer Co.: Truckee, *Bolt 194* (UC). Plumas Co.: Lassen Forest, Lost Creek, *Eggleston 7564* (GH, NY, US); N of Engelmine, *Stebbins & Jenkins 2248* (GH, UC). Shasta Co.: Lassen Volcanic Nat'l Park, summit area of Lassen Peak, *Gillett 310* (GH, S, UC, WTU), *Balls 9081* (BM, S); near the head of Little Hot Spring Valley, *Heller 18282* (MO, NY). Sierra Co.: ½ mile above upper Tamarack Lake, *Kruckeberg 3682* (NY, WTU). Siskiyou Co.: E of Mt. Shasta Ski Bowl Lodge, *Terrell & Holmberg 4190* (US); Mt. Fork, Hoolly Creek, *Butler 187* (UC); Spirit Lake, *Howell 14897* (UC); along Squaw Valley Creek meadows, *Cooke 17664* (MU); Mt. Eddy, *Heller 13429* (NY, US, WTU); S slope of Mt. Shasta, *Turesson & Alm 484* (S, UPS: 2 sheets). Tehama Co.: South Yolla Bolly Mt., Middle Eel-Yolla Bolly Primitive Area, *Munz 16935* (NY, WTU). Trinity Co.: Twinto Thompson Park, *Alexander & Kellogg 300* (UC); Salmon Mts., above Union Lake, *Hall 8691* (UC); ca. 15 miles N of Helena at Papoose Lake, *Spellenberg 5012* (NY). Tuolumne Co.: Dardanelles, *Howden 112* (UC). **Oregon:** Clackamas Co.: S slope of Mt. Hood, 1 mile above Timberline Lodge, *Rossbach 174* (UC). Deschutes Co.: N of North Sister Mts., near MacKenzie Pass, *Hitchcock & Martin 4871* (GH, MO, NY, UC, WTU). Hood River Co.: E slope of Mt. Hood, *Kruckeberg 3997* (NY, WTU). Jackson Co.: Siskiyou Mts., Ashland Peak, *Thompson 12339* (GH, NY, UC, US, WTU). Josephine Co.: near summit of Lake Mt., *Baker & Ruhle 331* (NY, WTU). Klamath Co.: Crater Lake Nat'l Park, *Heller 12614* (GH, MO, NY, UC, US, WTU: 2 sheets), *Irvine 515* (BM); Mt. Hood, *Thompson 12299* (GH, NY, UC; 2 sheets, US), *Moldenke 7150* (NY), *Ripley & Barneby 9531*

(NY: 2 sheets), *Mastrogiuseppe* 4713 (ws). Marion Co.: on ridge above Jefferson Park, Skyline Trail to Mt. Jefferson, *Dennis & Smith* 2256 (GH, NY, WTU); 4 miles S of Mt. Jefferson, *Nelson* 2871 (GH). Yakima Co.: Yakima Region, Cascade Mts., *Brandegee*, 14873 (MO). **Washington:** Klickitat Co.: without precise locality, *Suksdorf s.n.* (BM, NY). Lewis Co.: Mt. Rainier, *Piper* 2112 (GH: 2 sheets, NY, US); Mt. Burroughs, *Jones* 10346 (GH, NY). Pierce Co.: Mt. Rainier, *Evans* 10603 (MU), *Grant* 124 (US); above Goat Pass, *Thompson* 11081 (GH, MO, US, WTU: 2 sheets). Skarmania Co.: Mt. St. Helens, *Coville* 766 (US). Snohomish Co.: near Twin Lakes, *Broadbent s.n.* (WTU). Yakima Co.: Mt. Adams, *Thompson* 11166 (GH, NY, US, WTU); Cascade Mts., near Chinook Pass, *Thompson* 15142 (GH, MO, NY: 2 sheets, s, UC, US, WTU); Mt. Goat, *Allen* 127 (GH, K, MO, NY, UC, US: 2 sheets); west side of Mt. Peddo, *Suksdorf* 6367 (GH, MO, NY, WTU).

3b. ***Aconogonon davisiae*** (Brewer ex A. Gray) Soják var. ***glabrum*** (Jones) S.-P. Hong *comb. nov.* *Polygonum newberryi* var. *glabrum* Jones, *Rhodora* 40: 359. 1938. TYPE: U.S.A., Washington, Olympic Mts., Seven Lakes basin, without date, *Jones* 8322 (HOLOTYPE: GH!; ISOTYPE: WTU!).

Stem entirely glabrous; leaves 2.4–5.8 × 1.2–3.2 cm long, sublustrous on both sides, usually acute, rarely more or less obtuse, usually rounded, rarely truncate at the base, entirely glabrous on both sides including the margin; petiole glabrous 0.5–15.0 mm long; ochrea 0.8–1.5 cm long, glabrous; pedicels 0.6–1.4 mm long; tepals 2.9–3.6 × 1.0–2.0 mm; filaments 0.3–1.0 mm long; anthers 0.3–0.5 mm long. Chromosome number $2n = 20$ (information from the label of Kruckeberg, collection 5039).

ILLUSTRATIONS. Hitchcock et al., 1964: 162, *sub nomine Polygonum newberryi* var. *glabrum*. Figure 6 (map).

ECOLOGY AND DISTRIBUTION. *Aconogonon davisiae* var. *glabrum* grows on open rocky mountain sides, talus slopes or at the edges of raw serpentine outcrops. This variety is associated with *Pinus albicaulis* Engelm. and *Abies lasiocarpa* (Hook.) Nutt. It is distributed from Washington (Chelan Co., Clallam Co. and Kittitas Co.) and northern California, and probably in Oregon as well; however, I have seen no collections from Oregon so far (Figure 6). The known altitudinal range is 1050–2150 m.

REPRESENTATIVE SPECIMENS. UNITED STATES. **California:** Siskiyou Co.: Caribou Lake, Salmon-Trinity Alps Primitive Area, *Wiggins* 13540 (NY, UC). Trinity Co.: bordering headwaters of Deer Creek, in shadow of Granite Peak, on trail to Deer Lake, *Kruckeberg* 3758 (NY). **Washington:** Chelan Co.: Mt. Stuart region, *Thompson* 5830 (GH, MO, WTU). Clallam Co.: Olympic Mts., Bogachiel Ridge, headwaters of the Hoh River, *Rollins & Chambers* 2703 (GH, UC, US). Kittitas Co.: Mt. Stuart region, near head of Beverly Creek, *Thompson* 8760 (GH, MO, NY, UC,

US, WTU); Trail to Ingalls Lake, above N Fork Teanaway River, *Kruckeberg 5039* (UC).

ACKNOWLEDGMENTS

I am deeply indebted to Prof. Olov Hedberg, Dr. Mats Thulin, Mr. Svein Båtvik and two anonymous reviewers for their helpful comments on the manuscript. Also my thanks are due to Dr. R. Moberg (UPS) for handling the loans, to Ms. U.-B. Sahlström for photographic work, to Dr. O. Constantinescu for help with some Russian literature, to A. Batten (ALA) and J. Mastrogioseppe (WS) for supplying useful material. Sincere thanks are due to the Directors and Curators of the herbaria listed in the "Materials and Methods" section for their loans of specimens. Financial support for publication of this work from the Department of Systematic Botany, Uppsala University, is also gratefully acknowledged.

LITERATURE CITED

- ABRAMS, L. 1944. Illustrated Flora of the Pacific States: Washington, Oregon, and California, Vol. 2. Stanford Univ. Press, Stanford, CA.
- ANDERSON, J. P. 1959. Flora of Alaska and Adjacent Parts of Canada. The Iowa State Univ. Press, Ames, IA.
- BOWDEN, W. M. 1966. IOPB chromosome number reports. *In*: A. Löve, Ed., VIII. *Taxon* 15: 279–284.
- DAWE, J. C. AND D. F. MURRAY. 1979. IOPB chromosome number reports. *In*: A. Löve, Ed., LXIII. *Taxon* 28: 265–268.
- ERDTMAN, G. 1960. The acetolysis method. A revised description. *Svensk Bot. Tidskr.* 54: 561–564.
- . 1966. Pollen Morphology and Plant Taxonomy. Angiosperms. Corrected reprint of the edition of 1952 with a new addendum. Hafner Publ. Co., New York.
- GRIERSON, A. J. C. AND D. G. LONG. 1983. Flora of Bhutan, Vol. 1. Royal Bot. Gard., Edinburgh.
- HARA, H. 1966. The flora of Eastern Himalaya. Univ. of Tokyo Press, Tokyo.
- . 1982. Polygonaceae, pp. 172–180. *In*: H. Hara, A. D. Chater and L. H. J. Williams, Eds., An Enumeration of the Flowering Plants of Nepal, Vol. 3. Trustees Br. Mus. (Nat. Hist.) London.
- HARALDSON, K. 1978. Anatomy and taxonomy in Polygonaceae subfam. Polygonoideae Meisn. emend. Jaretzky. *Symb. Bot. Upsal.* 22: 1–95.
- HEDBERG, O. 1946. Pollen morphology in the genus *Polygonum* L. *s. lat.* and its taxonomic significance. *Svensk Bot. Tidskr.* 40: 371–404.

- HITCHCOCK, C. L., A. CRONQUIST, M. OWNBEY AND J. W. THOMPSON. 1964. Vascular Plants of the Pacific Northwest, Part 2. Univ. Washington Press, Seattle, WA.
- HOLMGREN, P. K., W. KEUKEN AND E. SCHOFIELD. 1981. Index Herbariorum 1. The Herbaria of The World, 7th ed. Regn. Veg. 106: 1–452.
- HONG, S.-P. 1989. *Knorringia* (= *Aconogonon* sect. *Knorringia*), a new genus in the Polygonaceae. Nord. J. Bot. 9: 343–357.
- . 1990. A new species of *Aconogonon* (Polygonaceae) in Burma and Yunnan. Notes from RBG Edinb. 46: 361–363.
- AND O. HEDBERG. 1990. Parallel evolution of aperture numbers and arrangement in the genera *Koenigia*, *Persicaria* and *Aconogonon* (Polygonaceae). Grana 29: 177–184.
- AND S. T. LEE. 1983. A palynotaxonomic study of the Korean Polygonaceae. Korean J. Pl. Tax. 13: 63–76.
- HOOKER, W. J. 1840. Flora Boreali-Americana, Vol. 2. London.
- HULTÉN, E. 1968. Flora of Alaska and Neighboring Territories. Stanford Univ. Press, Stanford, CA.
- KARTESZ, J. T. AND GANDHI, K. N. 1990. Nomenclatural notes for the North American flora, No. 2. Phytologia 68: 421–427.
- KONGAR, E. T. 1973. Knowledge of North American species of section *Aconogonon* Meisn. of genus *Polygonum* L. Bot. Žurn. SSSR 57: 1333–1339 (in Russian).
- KRÁL, M. 1985. *Rubrivena*, a new genus of Polygonaceae. Preslia 57: 65–67.
- MAREK, S. 1954. Morphological and anatomical features of the fruits of genera *Polygonum* L. and *Rumex* L. and keys for their determination. Monogr. Bot. 2: 77–161 (in Polish with English summary).
- . 1958. European genera of Polygonaceae in the light of anatomical and morphological investigations on their fruit and seeds. Monogr. Bot. 6: 57–79 (in Polish with English summary).
- MUNZ, P. A. 1959. A Californian Flora. Univ. California Press, Berkeley and Los Angeles, CA.
- POLUNIN, N. 1959. Circumpolar Arctic Flora. Clarendon Press, Oxford.
- POLUNIN, O. AND A. STANTON. 1984. Flowers of the Himalayas. Oxford Univ. Press, Oxford.
- PORSILD, A. E. 1943. Materials for a flora of the continental Northwest Territories of Canada. Sargentia 4: 1–79.
- . 1951. Botany of southeastern Yukon. Bull. Natl. Mus. Canada, Ottawa. 121: 1–400.
- AND W. J. CODY. 1980. Vascular Plants of Continental Northwest Territories of Canada. Natl. Mus. Canada, Ottawa. 667 pp.
- RONSE DECRAENE, L.-P. AND J. R. AKEROYD. 1988. Generic limits in *Polygonum* and related genera (Polygonaceae) on the basis of floral characters. J. Linn. Soc., Bot. 98: 321–371.
- SCOGGAN, H. J. 1978. The Flora of Canada, Part 3. (Dicotyledoneae: Saururaceae to Violaceae). Natl. Mus. Canada, Ottawa.
- SMALL, J. K. 1894. New and interesting species of *Polygonum*. Bull. Torrey Bot. Club 21: 168–173.
- . 1895. A monograph of the North American species of the genus *Polygonum*. Mem. Dept. Bot. Columbia Coll. 1: 1–183.

- SOJÁK, J. 1974. Observations on the genus *Truelleum* Houtt. (Polygonaceae). *Preslia*. 46(2): 139–156.
- STAINTON, A. 1988. *Flowers of the Himalayas. A Supplement*. Oxford Univ. Press, Delhi.
- STEARN, W. T. 1983. *Botanical Latin*, 3rd ed. David and Charles, Newton Abbot, U.K.
- TZVELEV, N. N. 1987. Notulae de Polygonaceis in flora Orientis Extremi. *Novit. Syst. Plant. Vasc.* 24: 72–79 (in Russian).
- . 1989. Polygonaceae, pp. 25–122. *In*: S. S. Charkevich, Ed., *Vascular Plants of the Soviet Far East*, Vol. 4. Nauka, Leningrad (in Russian).
- WILKINSON, H. P. 1979. The plant surface (mainly leaf), pp. 97–165. *In*: C. R. Metcalfe and L. Chalk, Eds. *Anatomy of the Dicotyledones*, 2nd ed., Vol. 1. Clarendon Press, Oxford.
- WILSON, K. L. 1988. *Polygonum sensu lato* (Polygonaceae) in Australia. *Telopea* 3: 177–182.

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